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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/756,542	01/13/2004	Stephan Mueller	5308-166CT	3861

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EXAMINER	
SONG, MATTHEW J	

ART UNIT	PAPER NUMBER
1722	

DATE MAILED: 10/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/756,542	MUELLER, STEPHAN	
	Examiner	Art Unit	
	Matthew J. Song	1722	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,11-22,55 and 56* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,11-22,55 and 56* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1 and 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Balakrishna et al (US 6,056,820) in view of Yonehara et al (US 5,853,478).

Balakrishna et al teaches a method of growing silicon carbide boules by physical vapor deposition (PVT), where a silicon carbide seed crystal **16** is carried by a seed holder **18** and high purity silicon is melted and vaporized in a PVT chamber and a silicon carbide is formed from a gaseous species resulting from the reaction of the silicon vapor and a carbon disc (col 1, ln 59-col 2, ln 67). Balakrishna et al also teaches a flux of silicon vapor is used to the silicon carbide boule (col 3, ln 30-50).

Balakrishna et al does not disclose forcing nucleation sites of a silicon carbide seed crystal to a predefined pattern.

In a method of forming a single crystal, note entire reference, Yonehara et al teaches a method for forming a crystal by utilizing a difference in nucleation density of the crystal forming materials so that only a single crystal may grow on a single nucleus (col 4, ln 1-40). Yonehara et al also teaches forming island shaped single crystal grains **13-1, 13-2** and the island crystal grains grow to become single crystals **13A-1, 13A-2**, this reads on applicant's forcing nucleation sites

to a predefined pattern (col 9, ln 1-60). Yonehara et al also teaches the deposition of a Si_3N_4 layer, patterning the SiN layer and single crystal growth of Si was performed on nucleation surfaces (S_{NDL}) using CVD (col 17, ln 1-55). Yonehara et al also teaches growth of the single crystal may be performed by other processes other than CVD, such as a method by evaporation of Si into a vacuum and sputtering (col 14, ln 30-65 and col 11, ln 30-45). Yonehara et al also teaches crystal growth of a variety of crystalline materials (col 14, ln 65 to col 15, ln 65 and col 6, ln 60-65). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Balakrishna et al with Yonehara et al's forming nucleation sites because single crystal are grown selectively with a necessary size and containing no grain boundary (col 3, ln 50-67 and col 19, ln 5-20).

Referring to claims 16, the combination of Balakrishna et al and Yonehara et al teaches forming a patterned Si_3N_4 layer.

Referring to claims 17, 18 and 20, the combination of Balakrishna et al and Yonehara et al is silent to the shape of the predetermined pattern. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Balakrishna et al and Yonehara et al by changing the shape of the predetermined pattern to grow different shapes of silicon carbide. Furthermore, Changes in size, dimensions, shape, proportion or mere duplication of parts are not sufficient to patentably distinguish over the prior art, unless the recited changes are critical, i.e., they produce a new and unexpected result which is different in kind and not merely in degree from the result of the prior art. In re Rinehart, 531 F.2d 1048, 189 USPQ 143. See also In re Dailey, 357 F.2d669, 149 USPQ 47. See also In re Harza, 274 F.2d 669, 124 USPQ 378.

3. Claims 1 and 16-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Balakrishna et al (US 6,056,820) in view of Uchida et al (EP 0 962 963).

Balakrishna et al teaches a method of growing silicon carbide boules by physical vapor deposition (PVT), where a silicon carbide seed crystal **16** is carried by a seed holder **18** and high purity silicon is melted and vaporized in a PVT chamber and a silicon carbide is formed from a gaseous species resulting from the reaction of the silicon vapor and a carbon disc (col 1, ln 59-col 2, ln 67). Balakrishna et al also teaches a flux of silicon vapor is used to the silicon carbide boule (col 3, ln 30-50).

Balakrishna et al does not disclose forcing nucleation sites of a silicon carbide seed crystal to a predefined pattern.

Uchida et al discloses a method of producing silicon carbide on a silicon carbide substrate, where a 4H hexagonal silicon carbide single crystal substrate, this reads on seed crystal, is masked by a graphite plate or a graphite sheet having a predetermined mask pattern and introduced into a CVD growing chamber and growth is developed only in a partial region corresponding to the mask pattern to form a 6H hexagonal silicon carbide on a predetermined region on a surface of a 4H hexagonal silicon carbide substrate, this reads on forcing nucleation sites of a silicon carbide seed to predefined pattern (Example 8). Uchida et al also teaches the invention is not limited to CVD and Molecular beam epitaxy or other methods may be used (col 15, ln 25-35). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Balakrishna et al with Uchida et al's mask pattern to force nucleation sites to

a predefined pattern because a crystal of silicon carbide can be easily grown in a desired region (col 19, ln 1-10).

Referring to claim 16 and 19, the combination of Uchida et al and Balakrishna et al teaches a graphite mask on a silicon carbide substrate, i.e. seed, with a predetermined pattern.

Referring to claims 17, 18 and 20, the combination of Uchida et al and Balakrishna et al is silent to the shape of the predetermined pattern. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Uchida et al and Balakrishna et al by changing the shape of the predetermined pattern to grow different shapes of silicon carbide. Furthermore, Changes in size, dimensions, shape, proportion or mere duplication of parts are not sufficient to patentably distinguish over the prior art, unless the recited changes are critical, i.e., they produce a new and unexpected result which is different in kind and not merely in degree from the result of the prior art. In re Rinehart, 531 F.2d 1048, 189 USPQ 143. See also In re Dailey, 357 F.2d669, 149 USPQ 47. See also In re Harza, 274 F.2d 669, 124 USPQ 378.

Referring to claim 22, the combination of Uchida et al and Balakrishna et al teaches a masked pattern of material of graphite, as applicant, and growth of silicon carbide occurs in partial region corresponding to the mask pattern. The regions of having a reduced sticking coefficient over other regions of the seed crystal is inherent the combination of Uchida et al and Balakrishna et al because the same material will inherently have the same sticking coefficients.

4. Claims 1, 11-15 and 55-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Balakrishna et al (US 6,056,820) in view of Vichr et al (US 5,753,038).

Balakrishna et al teaches a method of growing silicon carbide boules by physical vapor deposition (PVT), where a silicon carbide seed crystal **16** is carried by a seed holder **18** and high purity silicon is melted and vaporized in a PVT chamber and a silicon carbide is formed from a gaseous species resulting from the reaction of the silicon vapor and a carbon disc (col 1, ln 59-col 2, ln 67). Balakrishna et al also teaches a flux of silicon vapor is used to the silicon carbide boule (col 3, ln 30-50).

Balakrishna et al does not teach forcing nucleation sites of a silicon carbide seed crystal to a predefined pattern.

Vichr et al discloses a method of growing crystal, note entire reference, where a seed plate is patterned by depositing a patterned masking layer and the patterned seed plate is selectively etched to expose the bare surface of the seed plate, then the exposed, patterned bare surface of the seed pate is etched to form a plurality of nucleation structures consisting of the seed plate material and the remaining portion of the masking layer. Vichr et al also discloses each of the nucleation structures protrude outwardly from the underlying surface of the seed plate and provide ideal structures for single crystal growth and each structure comprises walls and a top surface (col 3, ln 45 to col 4, ln 67 and claim 1 and Fig 3). Vichr et al also discloses the seed plate can then be placed into a CVD crystal growing reactor and epitaxial crystal are grown on top of the mesas (col 5, ln 40-65), this regions of the seed crystal which extend beyond other regions of the seed crystal. Vichr et al also discloses the masking layer design consists of circles or squares or other geometrical figures on a rectangular, hexagonal or other grid pattern (col 9, ln 45-60). Vichr et al also teaches the crystal growth technique used to grow the large crystals is not critical and a variety of methods may be used (col 8, ln 55 to col 9, ln 5). It would have been

obvious to a person of ordinary skill in the art at the time of the invention to modify Balakrishna et al with Vichr et al to form large single crystals having high monocrystalline perfection which is can be used in electronic applications (col 3, ln 49-55).

Referring to claims 12-14, the combination of Balakrishna et al and Vichr et al teaches circles or squares or other geometrical figures on a rectangular, hexagonal or other grid pattern. A square pattern on a rectangular pattern reads on stripes. Furthermore, Changes in size, dimensions, shape, proportion or mere duplication of parts are not sufficient to patentably distinguish over the prior art, unless the recited changes are critical, i.e., they produce a new and unexpected result which is different in kind and not merely in degree from the result of the prior art. In re Rinehart, 531 F.2d 1048, 189 USPQ 143. See also In re Dailey, 357 F.2d669, 149 USPQ 47. See also In re Harza, 274 F.2d 669, 124 USPQ 378.

Referring to claim 15, the combination of Balakrishna et al and Vichr et al teaches each structure comprises walls and a top surface.

5. Claims 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hunter (US 6,063,185) in view of Balakrishna et al (US 6,056,820).

Hunter discloses a method for producing low defect density, low impurity SiC, where nucleation sites stainless steel heat sink rod **22** serves to preferentially cool nucleation sites through a graphite cooling disc member **23** that overlies the nucleation sites (col 4, ln 55 to col 5, ln 10). Hunter also discloses a circular seed **160** is engaged on its upper surface by a peg **90**, which preferentially cool each nucleation site, which extends from a graphite member **88** and the peg **90** is formed by milling (col 6, ln 1 to col 7, ln 15), where the regions engaging the peg **90**

reads on regions of higher thermal conductivity than the regions between pegs (Fig 4). Hunter also discloses a disc member **223** is divided into five concentric ring cooling zones **1-5** and sequential preferential cooling of nucleation sites as growth of single progresses and a heat removal system above each zone **1-5** may comprise separate, computer controlled concentric cooling water circulation zones contained within a heat sink rod and the system includes localized heat removal and structural formation encouraging localized heat removal (col 11, ln 35 to col 12, ln 15). Hunter also discloses bulk SiC is formed by sublimation (col 4, ln 40-67), this reads on applicant's physical vapor transport. It is also noted that the seed holder **123** covers a portion of the seed crystal **160**, note Fig 5B; therefore the nucleation sites are forced into a pattern which does not include the covered areas.

Hunter does not disclose growing a silicon carbide boule.

In a method of growing silicon carbide, note entire reference, Balakrishna et al teaches a method of growing silicon carbide by physical vapor deposition (PVT), where a silicon carbide seed crystal **16** is carried by a seed holder **18** and high purity silicon is melted and vaporized in a PVT chamber and a silicon carbide is formed from a gaseous species resulting from the reaction of the silicon vapor and a carbon disc (col 1, ln 59- col 2, ln 67). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Hunter with Balakrishna to form a boule, which can be sliced into wafers and used as semiconductor device substrates ('820 col 1, ln 30-45).

6. Claims 1, 11-15 and 55-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Balakrishna et al (US 6,056,820) in view of Beetz (US 5,006,914).

Balakrishna et al teaches a method of growing silicon carbide boules by physical vapor deposition (PVT), where a silicon carbide seed crystal **16** is carried by a seed holder **18** and high purity silicon is melted and vaporized in a PVT chamber and a silicon carbide is formed from a gaseous species resulting from the reaction of the silicon vapor and a carbon disc (col 1, ln 59-col 2, ln 67). Balakrishna et al also teaches a flux of silicon vapor is used to the silicon carbide boule (col 3, ln 30-50).

Balakrishna et al does not teach forcing nucleation sites of a silicon carbide seed crystal to a predefined pattern.

In a method of manufacturing single crystal articles, note entire reference, Beetz teaches a textured substrate which amenable to deposition thereon of single crystal films of silicon carbide (Abstract). Beetz teaches growth without the formation of microtwin and secondary nucleation (col 4, ln 20-67). Beetz also teaches the masked areas can be any shape (col 5, ln 15-30).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Balakrishna et al with Beetz to grow with the formation of microtwin and secondary nucleation, since the advantages have been realized in other bulk crystal growth, note columms 6-7 of Vaudo et al (US 6,596,079).

Response to Arguments

7. Applicant's arguments filed 1/13/2004 have been fully considered but they are not persuasive.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Yonehara et al teaches forming nucleation sites because single crystal are grown selectively with a necessary size and containing no grain boundary (col 3, ln 50-67 and col 19, ln 5-20). Crystals with no grain boundaries are desirable. Yonehara et al also teaches general application to single crystals used for electronic devices and Balakrishna et al teaches forming single crystal SiC for use in electronic devices (col 1, 5-67).

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). Yonehara et al also teaches application to single crystals in general used for electronic devices and Balakrishna et al teaches forming single crystal SiC for use in electronic devices (col 1, 5-67).

Applicant's argument that a person of ordinary skill in the art would not look to a thin film technique to form boules is noted but is not found persuasive. The Examiner admits that

Yonehara teaches thin film growth, but Yonehara can be relied upon for what it would reasonably suggest to a person of ordinary skill in the art. And a person of ordinary skill in the art would not limit Yonehara to thin film growth based on claim 1 for single crystal growth in general without any limitations on size. Furthermore, it is known in the art of single crystal manufacturing that thin film techniques can be used in the manufacturing of single crystal boules, note columns 6-7 of Vaudo et al (US 6,596,079), which teachs using patterned interlayers, such as those taught by Beetz, Jr. (US 5,006,914) for thin film manufacturing, in a thick boule growth. Therefore, this supports the Examiner's position that a person of ordinary skill in the art would have found it obvious to use thin film techniques in bulk growth, when the prior art does not suggest otherwise. Applicants have merely stated opinion that one skilled in the art would not look to thin film techniques for boule growth without providing any evidence to support their position. The argument is not persuasive because it is viewed as mere attorney argument, which lacks evidence. The same argument applies to Vichr since Vichr teaches epitaxial layers, not boules, but is not limited to epitaxial layers.

Applicant's argument that one of skill in the art would not be motivated to combine MBE with sublimation boule growth is noted but is not found persuasive. The Examiner's position is that Yonehara suggests other deposition processes can be used, particularly evaporation of reactants into vacuum, such as MBE. The PVT process used in boule growth is merely sublimating reactants and supplying them to a substrate in a vacuum, similar to Yonehara's suggestion; therefore using Balakrishna et al's PVT process would have been obvious. The same argument applies to Vichr since Vichr teaches other deposition techniques can be used.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Yonehara teaches patterning a substrate. Combining with Balakrishna et al's seed crystal, the substrate would be the seed crystal.

Applicant's argument that an explanation of why one of skill in the art would combine the teachings of thin film formation with boule growth is noted but is not found persuasive. Yonehara merely teaches a particular embodiment for thin film growth. Yonehara et al's teachings are for general single crystal growth, which would encompass boule growth, note claim 1 Furthermore, thin film growth techniques have been used in the manufacturing of bulk single crystal, note Vaudo et al (US 6,596,079) and Beetz, Jr. (US 5,006,914); therefore it is obvious to a person of ordinary skill in the art to use thin film techniques in bulk single crystal growth. Applicant has provided no evidence to contrary; therefore this argument is not persuasive. The same argument applies to Vichr since Vichr teaches epitaxial layers, not boules, but is not limited to epitaxial layers.

Applicant's argument that Uchida does not suggest a combination with a PCT process is noted but is not found persuasive. Uchida teaches the growth methods are not limited to using MBE or CVD and the various well-known methods of crystal growth may be employed. PVT is a well known method of crystal growth and Uchida suggests the method of growth is not critical and other well known methods can be used; therefore Uchida does suggest PVT.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Uchida teaches masking to have selective crystal growth [0101] and silicon carbide with good crystallinity can be formed by making [0072]-[0073]); therefore it would have been obvious to a person of ordinary skill in the art to use masking to form SiC in selective areas to promote good crystallinity.

Applicant's argument that Uchida teaches different crystal systems is noted but is not found persuasive. Uchida teaches the desirability of different crystal systems, as suggested by applicant, however theses are merely suggestions and not essential. Crystal growth without stacking would have been obvious.

Applicant's argument in regards to shape are noted but are not found persuasive. The shapes are not shown to be critical and changes in shape are held to be obvious, absent evidence of unexpected results, which have not been provided.

Applicant's argument that Hunter does not teaches forcing nucleation sites of a seed crystal to a predefined pattern is noted but is not found persuasive. Hunter teaches a disc member **223** is divided into five concentric ring cooling zones to create a preferentially cooled nucleation site and nucleation sites can be either unseeded or seeded (col 11, ln 25-67); therefore Hunter does teach a pattern of nucleation sites for a seed crystal. It is also noted that the seed holder **123**

covers a portion of the seed crystal **160**, note Fig 5B, therefore the nucleation sites are forced into a pattern of shape which does not include the covered areas.

Double Patenting

8. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

9. Claims 1 and 55 are rejected under the judicially created doctrine of double patenting over claims 1 and 8 of U. S. Patent No. 6,706,114 ('144) since the claims, if allowed, would improperly extend the "right to exclude" already granted in the patent.

The subject matter claimed in the instant application is fully disclosed in the patent and is covered by the patent since the patent and the application are claiming common subject matter, as follows: '114 claims a method of producing silicon carbide by forcing nucleation sites of a seed crystal to a predefined pattern and using PVT.

Claim 1 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-8 of U.S. Patent No. 6,706,114 ('144). Although the conflicting claims are not identical, they are not patentably distinct from each other because '114 claims a method of producing silicon carbide by forcing nucleation sites of a seed crystal to

a predefined pattern and using PVT. '114 does not claim boule growth, however it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify '114 to form boules because boules are conventionally formed using PVT.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Sawin et al (US 5,450,205) teaches CVD and physical vapor transport are methods of depositing thin films of a substrate (col 4, ln 25-35).

Cline et al (US 3,990,093) teaches a suitable mask for semiconductor devices define one or more geometrical shapes, for example a circle or a square (col 2, ln 25-32).

Vaudo et al (US 6,596,079) teaches the use of patterned seeds with etched regions or coated regions that prevent growth on specific regions of the seed in order to reduce defect density in boule growth using patterned interlayers taught by Beetz (US 5,006,914) (col 6-7).

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Song whose telephone number is 571-272-1468. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Matthew J Song
Examiner
Art Unit 1722

MJS
September 28, 2005

ROBERT KUNEMUND
PRIMARY EXAMINER